



Relational maintenance on social network sites: How Facebook communication predicts relational escalation



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ABSTRACT

Social network sites are popular communication tools that help people maintain relationships with their friends, yet there has been little research examining how people use these tools to enact relationship maintenance. By analyzing communication between individual friendships on a popular social network site, Facebook, this research examines types of maintenance behaviors enacted on the site, and how they predict relational escalation of Facebook friendships. Results show that most relationships go through a gradual rather than an extreme change and that these changes reflect both relational escalation and de-escalation. Temporal patterns—more recent and more frequent communication—predict relationship escalation, as does use of more different types of communication within Facebook, particularly private messages and photo tags. However, enactment of traditional relationship maintenance strategies as captured by the linguistic analysis of Facebook communication content using LIWC does not predict relationship escalation. These findings contribute to our theoretical understanding of the ways that the functionality of social network sites can help users engage in new types of relationship maintenance.

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1. Introduction

The most common first answer to “what is it that makes your life meaningful?” is close and satisfying relationships (Berscheid, 1985), but like all good things in life, they are not free. They require “relationshiping”, or work to keep them in “good working order” (Duck, 1985). Social network sites (SNSs) are powerful tools for facilitating this relationship work because they afford quick interaction with many others and with relatively low costs (Tong & Walther, 2011; Vitak, 2012). In particular, maintaining relationships is one of the primary uses of Facebook (Ellison, Steinfield, & Lampe, 2011; Joinson, 2008; Qiu, Lin, Leung, & Tov, 2012), a popular SNS that boasts over one billion monthly active users.

Despite the popularity of Facebook as a tool to maintain relationships, with few exceptions (e.g., Bryant & Brody, 2010; Ellison, Vitak, Gray, & Lampe, *in press*), there is still “little empirical research that describes the specific communication-based relational activities that occur on these sites” (Ellison et al., 2011, p. 2). SNS platforms like Facebook afford different types of interaction and present “a dramatically new way to enact relational maintenance” (Walther & Ramirez, 2009, p. 302), but their utility in preserving a relationship in a desired state, the main function of relational

maintenance, is yet to be explored. Along with the multiple affordances of SNS platforms, users manage multiple types of relationships on SNSs. For example, while all Facebook connections are referred to as “friends”, people use the site to interact with “friends” ranging in closeness, from “Close Friends” to “Friends of Others” (Parks, 2010). This implies that Facebook users are making use of different types of interaction afforded by Facebook to do different types of relationship work within the site.

Further, while it has long been pointed out “that the maintenance and stability of relationships are also processes” (Duck, 1985, p. 671), most research on relational maintenance gives a one-shot assessment of the process (see for review, Stafford, 2003), and does not address how maintenance behaviors contribute to change, or lack thereof, in relationships. As Facebook allows people to reconnect by reestablishing lost connections and strengthening weak social ties (Bryant & Marmo, 2012), it is possible that Facebook relational maintenance does not only aid in preserving relationships in a certain state, but can also contribute to their escalation. Conversely, creating and maintaining “friends” on Facebook is easy, and these links may persist even when relationshiping does not occur and relationships de-escalate. Thus, this paper asks whether Facebook relationships remain stable or whether they change over time, and what types of Facebook maintenance behaviors are associated with change in Facebook relationships.

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Finally, because most studies on relationship maintenance rely on self-report surveys of maintenance behaviors, the question they focus on is “not the one of what people do to maintain their relationships? But rather: What is it that people think they do, or report they do, to maintain their relationships?” (Stafford, 2003, pp. 70–71). An additional contribution of this paper is to move beyond analyses of perceptions of relationship maintenance behaviors, to analyses of actual enacted maintenance behaviors.

1.1. SNSs as a new context for relational maintenance

The majority of time that partners have in a relationship is spent maintaining it (Duck, 1988), or engaging in activities that keep it in existence, in a specified or satisfactory condition, or in repair (Dindia, 2003). Most important of these activities are strategic and routine communication behaviors such as openness, positivity, and assurances (Dainton & Stafford, 2000; Stafford & Canary, 1991). The perceived use of these communication strategies is associated with relational stability and escalation, and a lack of perceptions of them can signal a relationship headed toward de-escalation. Thus, relational maintenance is a process through which relationships unfold, stabilize, or change, and it is enacted through both mediated and unmediated communication (e.g., Ledbetter, 2010; Ramirez & Broneck, 2009).

Recently, SNSs like Facebook have received much attention as increasingly popular platforms for maintaining personal relationships (Bryant & Marmo, 2012; Ellison et al., in press; Vitak, 2012), which offer a variety of affordances and resources that may extend and change relational maintenance performance (Tong & Walther, 2011). Furthermore, SNSs' relational contexts differ from typical offline relational contexts in their size (Parks, 2010) and composition—by combining different relational types within the same communication context (boyd, 2006)—also suggesting that relational maintenance may acquire new functions and forms on SNSs.

These relationships may stay stable or change by escalating or de-escalating. For example, the large proportion of lapsed friendships and familiar strangers on Facebook suggests their latent value and a possibility for them to be reactivated and escalated as needed (Parks, 2010). Although recent research has examined a relationship between Facebook maintenance behaviors and various relational outcomes (e.g., Kanter, Afifi, & Robbins, 2012; Vitak, 2012), the question of stability and change in relational types on Facebook remains largely unexplored. Therefore, we pose the following research question:

RQ1: How stable are relationships on Facebook?

1.2. New ways to maintain relationships on Facebook

The differences in the size and composition of SNS networks compared to offline interactions raise questions about which maintenance strategies people rely onto preserve or change these relationships, and whether these strategies are different than those in face-to-face interactions. Tong and Walther (2011) propose that SNSs' affordances reduce relational transaction costs for partners, which enable them to perform relational maintenance within large networks. In turn, the reductions in relational maintenance costs may bring about new functions of relational maintenance on SNSs, which Tong and Walther describe as (a) presence, (b) tie signs, and (c) mundane communication. Next, we consider specific types of SNS behaviors that may align with the aforementioned functions, and how they can predict escalation of Facebook relationships.

Presence refers to partners' awareness of each other, a sense of emotional connection and closeness, and a feeling of staying in touch. We propose that a partner's presence as a function of relational maintenance will be most prominently reflected in fre-

quency and temporal patterns of SNS communication. These dimensions are important because frequent contact renders “the interactional co-presence” of relationship partners helping them to create a relationship continuity, even when they are not physically co-present (Sigman, 1991). Indeed, previous research has linked temporal characteristics and frequency of communication between partners to their relational closeness or tie strength both in offline settings (Granovetter, 1973; Mansson & Myers, 2011; Marsden & Campbell, 1990) and on Facebook (Bryant & Marmo, 2010; Bryant & Marmo, 2012; Donath, 2008; Ellison et al., in press; Gilbert & Karahalios, 2009).

Along with higher frequency, closer relationships tend to make use of more media types of communication, as consistent with media multiplexity theory (Haythornthwaite, 2005). As Facebook is a platform that affords several media types of communication in itself (e.g., status updates, comments on others' posts, photo posting and tagging, chat, etc.), this trend is also present when analyzing communication on the site (Ledbetter et al., 2011). Thus, amount, frequency, and media types of Facebook communication can serve as attention signals to a partner and interest in and commitment to a relationship (Donath, 2008), helping to sustain a feeling of interaction co-presence and relationship continuity. Consequently, some of these Facebook dimensions may be related to relational escalation and de-escalation leading us to pose the following question:

RQ2: What frequency and temporal aspects of Facebook communication between relationship partners predict relational escalation?

A tie sign refers to “public displays of connection” (Donath & boyd, 2004) that serves both to signal a relational bond to an external audience and to reinforce it for the partners themselves. Facebook is a multi-media platform offering various ways to communicate with relational partners ranging in the degree of publicness, media richness, and effort costs, and the types of Facebook communication that one chooses to use can be meaningful. Public forms such as posting on a friend's wall can signify to the friend, and others, that these partners share a relationship, a process referred to as “social grooming” (Donath, 2008). Private Facebook communication can help maintain relationships by signifying to a partner that sensitive information is being shared with him/her alone (Bazarova, 2012).

Different types of Facebook communication also come at different costs to the sender. For example, it takes less time to click the “like” button than to compose and post a comment on a friend's photo. As such, “likes” are less likely to express affection compared to messages and photo comments (Mansson & Myers, 2011). In this way selection of one type of media over the other can be a “signal of the resources one is willing to commit to [the] relationship” (Donath, 2008, p. 238), which can impact perceptions of equity within the relationship (Tong & Walther, 2011).

Likewise, Facebook users describe using certain types of communication to enact maintenance strategies; posting and commenting on photos is a way to share experiences and reflect on shared memories of events (Bryant & Marmo, 2010), while posting photos and tagging a friend can express affection through Facebook (Mansson & Myers, 2011). These differences between the various types of Facebook communication and the signals that they send in relational maintenance lead to our third research question:

RQ3: Usage of what types of Facebook communication between relationship partners predicts relational escalation?

Finally, the role of mundane activities and observations in relational maintenance, while important in offline communication (Duck, 1988), may be even more salient with SNSs as the systems

actively solicit mundane sharing (“What are you doing right now?”) and responses to others’ posts (“Write a comment”). Beyond the temporal nature of and choice of media for conducting relational communication, there has been significant focus on what is communicated through this mundane sharing and how it contributes to relationship maintenance. For example, intimacy is one of the dimensions that indicates tie strength, and Gilbert and Karahalios (2009) also found this to be true of Facebook communication. Relational closeness is also characterized by certain types of language use (Pennebaker & King, 1999), and analyses of Facebook communication show that verbal immediacy in wall posts is correlated with relationship closeness, but verbal immediacy in private messages is not (Bazarova, Taft, Choi, & Cosley, 2012).

For relationship maintenance specifically, communication content is essential because communication reflects the way that partners agree on their relationship definition (Ayres, 1983) and conduct relationship activities to sustain or change this definition (Bryant & Marmo, 2010). The most frequently adopted typology of communication strategies for relational maintenance includes positivity, self-disclosure, openness or having open discussions about the relationship, and assurances or showing commitment to a relationship (Stafford & Canary, 1991). These strategies are positively associated with relational outcomes, although this evidence is based on message perceptions, rather than the analysis of actual communication content (see for review, Stafford, 2003). Evidence also suggests that different strategies play different roles in supporting stability or change in relationships. Specifically, self-disclosure is used more often to escalate than to maintain stable relationships, and openness is used more often to repair or maintain stable relationships, while assurances are used equally to maintain stable or escalate relationships (Guerrero, Eloy, & Wabnick, 1993). The various strategies for maintaining and signaling relationships through communication, along with the novel affordances of SNSs, leads to our final research question:

RQ4: What linguistic content in Facebook communication predicts relational escalation?

2. Methods

2.1. Participants

Participants were recruited from a large northeast U.S. university via a system that lists experiments for students to participate in for the purpose of earning extra course credit. The sample consisted of 256 students enrolled in communication, human development, psychology, or business courses ranging from 18 to 44 years of age ($M = 20$, $SD = 3.4$, $Mdn = 19$). Since people of different ages use social technologies differently (e.g., Pfeil, Arjan, & Zaphiris, 2009), we removed from our data participants who were 28 years of age or older (two standard deviations above the mean); our final sample consisted of 240 students (73% female, 26% male, 1% did not disclose) ranging from 18 to 27 years of age ($M = 20$, $SD = 1.7$, $Mdn = 19$). Participants’ Facebook usage was measured using the self-report Facebook intensity scale (as adapted by Bryant & Brody, 2010), and scores ranged from 1.4 to 5.0 on a 5-point scale (Cronbach’s $\alpha = .81$, $M = 3.8$, $SD = .72$, $Mdn = 3.9$). Facebook usage data was also automatically collected using the Facebook Application Programming Interface (API), showing that participants had between 55 and 2544 Facebook friends ($M = 882$, $SD = 471$, $Mdn = 830$) and between 7 and 11,021 posts on their Facebook walls ($M = 1853$, $SD = 1784$, $Mdn = 1324$).

2.2. Procedure

The data were collected in the fall of 2012. After providing consent, each participant used the Facebook application that adminis-

tered an online survey and integrated with the Facebook API to collect Facebook communication data. The application first selected 15 of the participant’s Facebook friends; two of these friends were selected from the participant’s “Close Friends” friend list if it was populated, and the remaining were randomly selected from all of the participant’s Facebook friends. Close friends were explicitly sampled to ensure that the sample of Facebook friendships would include a more equal balance of close and casual relationships, since Facebook users tend to have a larger percentage of more casual than close Facebook relationships (Parks, 2010).

For each of these friends, the application collected all instances of Facebook communication between the friend and the participant in which one friend directly identified the other. This included all photos or videos that either friend uploaded and tagged the other friend in, wall posts from either friend to the other, status messages that either friend posted and tagged the other friend in, private messages between the friends, and likes or comments from either friend on the other friend’s albums, photos, wall posts, or status updates. For each of these communication instances, the application collected the type of communication, the timestamp of the communication (except for likes, as timestamps are not accessible using the API), the direction of the communication, and the content of the communication.

Given the sensitive nature of this communication data, extra care was taken to protect the privacy of participants and their friends. These measures came about through discussions with the university Institutional Review Board and in accordance with the policies surrounding the Facebook API. During the consent process, participants were provided with a complete description of the types of data that would be collected from their Facebook profile, along with how these data would be used. Further, before our Facebook application was able to collect communication data, participants had to authorize the application to access their Facebook data by agreeing to an additional permissions pop-up screen developed by Facebook that detailed the types of data that the application would have access to.¹ In addition to making the participant aware of the data being collected, similar to the procedure in Gilbert and Karahalios (2009), we made the decision to only conduct automatic analysis of the communication content and not to code it manually or to include excerpts of collected data in any published works. This decision was made because a participant’s Facebook data includes not only communication content created by the participant himself/herself, but also by the participant’s friends, who could not directly consent to our study procedure.

2.3. Relationship measures

Participants also answered survey questions about their relationships with each of their 15 friends selected by the application. They completed the Interpersonal Solidarity Scale (IPS; measured on a 7-point Likert scale, with 1 = “Not at all close” and 7 = “Extremely close”), which measures perceived psychological closeness with each of their friends at the present time (Cronbach’s $\alpha = .97$, $M = 4.10$, $SD = 1.52$) (Wheless, 1978). Participants additionally categorized their relationship with each of their friends at the current time using Parks’ (2010) typology of Facebook relationships, which includes 13 categories such as “Close Friends”, “Activity Friends”, “Family Members”, and “Current Romantic Interests.” In addition to categorizing their friendships at the present time, participants were asked which of the categories each of their friendships would have fallen into prior to the relationship falling into the current category. Participants were given the option to select between zero and five past relationship categories, and entered them into the survey in chronological order.

¹ For more information on the login permissions screen, see <https://blog.facebook.com/blog.php?post=403443752130>.

Relationship stability, escalation, and de-escalation was captured by comparing the present relationship category and the most recent past relationship category to capture the most recent relationship change. Out of all of the relationships in our sample, participants selected at least one past category for 98% of relationships, two past categories for 77% of relationships, three past categories for 59% of relationships, four past categories for 45% of relationships, and five past categories for 38% of relationships. The high percentage of relationships with more than just one past relationship category suggests that this most recent past category applies to the recent as opposed to the distant past. The fact that many relationships have multiple past categories, combined with our relatively young sample (averaging 20 years of age, of which Facebook has been in existence for 8) suggests that this most recent relationship change was likely to have happened during the time period that friends were also friends on Facebook.

To quantify changes in relationship categories, relationship types of similar closeness were first categorized together, with “Close Friends” as strong ties (level 3); “Co-workers, Colleagues”, “Activity Friends”, “Acquaintances”, “College Classmates” as medium-strength ties (level 2); and “Lapsed Friendships” and “Familiar Strangers” as very weak ties (level 1). These groups were different based on the measure of IPS used to evaluate the current state of relationships, $p < .001$. Based on participants’ responses, each relationship in the data set was coded by level at the present time and in the past, and change was measured by subtracting the past from the present level. The resulting measure of relationship change ranges from +2 to -2, where +2 = extreme escalation, +1 = escalation, 0 = stability, -1 = de-escalation, and -2 = extreme de-escalation. Four categories (“Family Members”, “Current Romantic Interests”, “Current Roommates”, and “Fans”) were excluded from this analysis because they were either stable over time (i.e., “Family Members”), represented a non-mutual relationship (i.e., “Fans”), or reflected a current state of a relationship, with no exact counterpart for the past category (i.e., “Current Romantic Interests” and “Current Roommates”). Fig. 1 shows relational changes broken down by a relationship type.

2.4. Facebook communication measures

From the Facebook communication data collected between the selected friends (including communication from the participant to the friend, and vice versa), several different measures were

computed. Measures of temporal Facebook behavior include the number of days since first Facebook communication ($M = 608$, $SD = 546$, $Mdn = 416$), the number of days since last Facebook communication ($M = 281$, $SD = 410$, $Mdn = 101$), the average number of days between Facebook communication ($M = 42$, $SD = 73$, $Mdn = 13$), and the total number of communication instances on Facebook used within the friendship ($M = 28$, $SD = 64$, $Mdn = 6$).

Measures related to use of different media within Facebook include the number of different types of Facebook communication that were used within the friendship, which ranged from 1 to 9 different types of communication ($M = 2.9$, $SD = 2.0$, $Mdn = 2.0$) and the total number of communication instances for each type of Facebook communication (see Table 1).

Finally, the content of relational communication on Facebook between the selected friendships was analyzed using the Mac version of LIWC 2007 (Pennebaker, Booth, & Francis, 2007; the communication text was not pre-processed prior to analysis with LIWC). LIWC allows for the automatic analysis of text-based communication along several dimensions (e.g., Kahn, Tobin, Massey, & Anderson, 2007; Lortie & Guitton, 2011; Tausczik & Pennebaker, 2010) and has been used frequently in the study of computer-mediated communication (e.g., Bazarova et al., 2012; Gilbert & Karahalios, 2009). The selection of LIWC categories was based on previous work using language variables to capture relational processes (e.g., Gilbert & Karahalios, 2009) and conceptual definitions of relationship maintenance processes (Stafford, 2003; Stafford & Canary, 1991). Specifically, we used the following language variables: (a) intimacy measured as total percentage of words that match the following LIWC categories: family, friends, home, sexual, swears, work, leisure, money, body, religion and health, $M = .50$, $SD = .37$, $Mdn = .48$); (b) verbal immediacy measured based on Pennebaker and King’s work (1999) as an arithmetic mean of the LIWC scores for first person singular pronouns (e.g., I, my, me), present tense verbs, discrepancies (e.g., could, would, should) and inverse scores for words of more than six letters and articles, $M = -.97$, $SD = 2.36$, $Mdn = -.46$); (c) positivity reflecting the degree of positive language measured as total percentage of positive-emotion words, $M = 13.92$, $SD = 8.44$, $Mdn = 12.22$); (d) self-disclosure capturing the extent to which partners disclose thoughts and feelings, especially related to negative emotions measured by total percentage of first person singular pronouns and words relating to sadness and anxiety, $M = 1.81$, $SD = .92$, $Mdn = 1.89$; and (e) assurances empha-

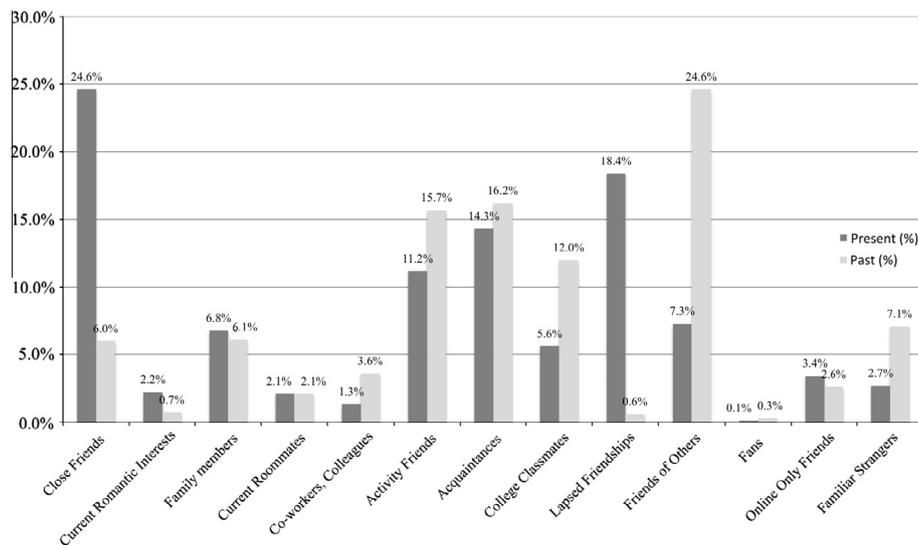


Fig. 1. Distribution of friendship categories in the present and the past for the 1544 Facebook friendships collected.

Table 1

Descriptive statistics for the total number of communication instances used within relationships by type of Facebook communication.

	<i>M</i>	<i>SD</i>
Album comments	.2	1.5
Album likes	.2	1.0
Photo tags	1.4	4.4
Photo likes	2.9	8.3
Photo comments	7.8	25.5
Wall posts	3.0	12.7
Wall comments	4.7	19.7
Wall likes	2.1	8.0
Messages	6.0	11.6

sizing commitment to a relationship measured by total percentage of first person plural pronouns, social words, and future words, $M = 3.57$, $SD = 1.66$, $Mdn = 3.60$.

We used the above variables as language proxies for perceived relational processes, which were computed individually for each instance of communication within a Facebook friendship and then aggregated at the friendship level. During aggregation, distinctions between the type of communication were maintained, resulting in three measures of each of the six language content variables—wall communication (wall posts and wall comments), photo communication (album and photo comments), and private message communication. These measures captured the total amount of the specific linguistic content exchanged between the participant and his/her friend in each of the above Facebook media.

3. Results

The data was structured hierarchically, with multiple friendship observations nested within each participant. Additionally, for RQ2, RQ3, and RQ4, the outcome variable was measured on an ordinal scale, which required multilevel modeling of categorical outcomes (Heck, Thomas, & Tabata, 2012). To control for non-independence and account for variability at each level of the data, we employed multilevel modeling for ordinal outcomes in SPSS Generalized Estimating Equations (GEE). This procedure allows a user-specifiable cumulative logit model which we used to model relational escalation, or the predicted odds of being in a higher relational category rather than being in a lower relational category. All the continuous predictors were standardized prior to the analyses.

3.1. Stability of Facebook relationships

Fig. 1 shows the distribution of different types of friendships in our sample at the time of data collection, as well as in the past. Note that Facebook friendships were not selected randomly, therefore this table is not reporting on a representative sample of the types of friendships of Facebook users, but instead overrepresents close friends. Overall, participants labeled a larger percentage of their 15 selected friends as “Close Friends” or “Lapsed Friendships” in the present than they did these same friends in the past, while less of these friends were labeled as “Friends of Others”, “College Classmates”, “Activity Friends”, “Familiar Strangers”, “Co-workers”, and “Acquaintances” in the present than they were in the past. When analyzing the stability of individual Facebook relationships, we found that 2.1% of relationships extremely de-escalated, 17.0% de-escalated, 56.7% remained stable, 22.4% escalated, and 1.8% extremely escalated. Thus, in answer to RQ1, we saw changes in 43% of relationships, with 19.1% de-escalated and 24.2% escalated relationships. As expected, most relationships went through a gradual (escalation/de-escalation) rather than a radical (extreme escalation/extreme de-escalation) change. The next analyses will examine an association between different Facebook behaviors—

frequency, temporal patterns, media types, and communication content—and the process of relational change.

3.2. Frequency and temporal patterns of communication

The first analysis was done on the frequency and temporal patterns variables, along with individual control variables—participant age, participant sex, friend sex, and participant Facebook intensity use. The results showed that days since last Facebook communication, average days between Facebook communication, and number of types of Facebook communication were significant predictors (see Table 2). Specifically, 1-*SD* increase in the number of different communication media types partners use on Facebook (e.g., wall posts, private messaging, photo comments, etc.) is associated with 81.3% increase in the predicted odds of relationship escalation between partners; in contrast, the expected odds of relationship escalation are reduced by 30.9% for 1-*SD* increase in the number of days between their Facebook communication, and by 53.5% for 1-*SD* increase in the number of days since their last communication, suggesting that relational escalation is associated with more frequent and more recent Facebook communication. Thus, among frequency and temporal aspects of Facebook communication, relationship escalation was associated with fewer days since last Facebook communication, fewer average days between Facebook communication, and a greater number of media types of Facebook communication.

3.3. Communication in different media

The next analysis breaks down frequency of communication by different Facebook media types to address RQ3 of which types of Facebook communication, if any, is associated with relationship escalation on Facebook. In addition to the different Facebook media variables, we also included temporal pattern variables (average number of days in between, number of days since last communication, and number of days since first communication on Facebook) and the same individual-level control variables as in the previous analysis.

First, we ran the model without any temporal controls focusing only on the frequency of communication in different media types. This initial analysis yielded three significant predictors: number of private messages, $\beta = 1.690$, $p < .001$; number of photo tags, $\beta = 1.329$, $p < .004$; and number of photo likes, $\beta = 1.246$, $p < .027$. None of the individual controls were significant at the .05-level. After the inclusion of temporal variables, only number of private messages and number of photo tags remained significant among the media types of communication (see Table 3). Thus, even after controlling for temporal patterns of communication and individual factors, relationship escalation was associated with more private messages, with the predicted odds of relationship escalation increased by 24.8% for a 1-*SD* increase in the number of private

Table 2

Exponentiated standardized coefficients representing the predicted odds of relationship escalation based on a 1-*SD* increase in frequency and temporal patterns of Facebook communication.

Frequency and temporal patterns	β
Days since first FB comm.	1.120
Days since last FB comm.	0.465***
Average days between FB comm.	0.691***
Total number FB comm. instances	1.045
Number of media types of FB comm.	1.813***
Participant FB intensity	1.122
Participant age	1.195
Participant sex	1.041
Friend sex	0.900

*** $p < .001$.

messages, and more photo tags, with the predicted odds of relationship escalation increased by 27.5% for a 1-SD increase in the number of photo tags between the participant and his/her friend.

3.4. Content of relational communication

Given the previous findings about linguistic content having a different functionality in different Facebook contexts (Bazarova et al., 2012), the next three analyses examine the linguistic content variables broken down by Facebook media type. These analyses include the different linguistic content variables and additional controls for individual and temporal factors, in addition to the total number of wall communication instances, photo communication instances, or private message instances, depending on the model as an additional control.

As with the analysis on media types, we first focused on linguistic content and frequency of each media type, without including temporal controls. The first analysis run on wall posts and comments, which included both inbound and outbound communication, showed that among linguistic content, only positive emotional content was a significant predictor, $\beta = .674$, $p < .001$, but in a negative direction. Additionally, the number of total wall posts and comments was positively related to relationship escalation, $\beta = 1.266$, $p < .005$. Similarly, for messages featured in photos and albums, and private messages, relationship escalation was positively associated with the quantity of specific types of Facebook communication, for photo comments, $\beta = 1.328$, $p < .001$, and for private messages, $\beta = 1.575$, $p < .002$. Relationship escalation was not associated with linguistic content for messages, but for photo comments, self-disclosure was negatively associated with relationship escalation, $\beta = 0.854$, $p < .031$.

The final analyses added temporal variables in the models to control for temporal patterns of Facebook communication between partners (Table 4). For the analysis on wall posts, in addition to significant temporal predictors, relationship escalation was associated with a decrease in positive emotionality such that the predicted odds of relationship escalation decreased by 27.8% with 1-SD increase in positive emotional comment in bi-directional wall posts and wall comments. After controlling for temporal patterns, the frequency of content became non-significant across all the media types, with $p > .05$ for all of the following: wall posts and comments, $\beta = 1.074$, photo comments, $\beta = 0.985$, and private messages, $\beta = 1.029$.

Table 3

Exponentiated standardized coefficients representing the predicted odds of relationship escalation based on a 1-SD increase in Facebook communication in different media types controlling for temporal and individual factors.

Communication in different media	β
Num. of album comments	1.061
Num. of album likes	1.029
Num. of photo tags	1.275**
Num. of photo likes	1.083
Num. of photo comments	0.919
Num. of wall posts	0.980
Num. of wall comments	1.050
Num. of wall likes	1.096
Num. of messages	1.248*
Days since first FB comm.	1.387**
Days since last FB comm.	0.368***
Average days between FB comm.	0.658***
Participant FB intensity	1.123
Participant age	1.206
Participant sex	1.017
Friend sex	0.944

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Thus, the analyses for RQ4 showed that among the different types of linguistic content in Facebook communication, only positivity in wall posts and comments was negatively related to relationship escalation. In general, these results point out to a greater importance of temporal patterns of communication as an indicator of relationship escalation than the amount of content exchanged in different media or its specific linguistic characteristics measured in these analyses.

4. Discussion

This study has explored stability and change in Facebook relationships, and how Facebook affordances may contribute to new functions and types of relationship maintenance that correspond to relational escalation. Mapping Tong and Walther's (2011) description of presence, tie signs, and mundane communication as the novel relational maintenance functions of SNSs, we explored different types of Facebook communication that could capture each of these functions: frequency and temporal patterns for presence, types of Facebook media for tie signs, and linguistic content of communication for the analysis of strategic maintenance behavior as well as mundane and everyday exchanges.

The results, while correlational and not causal, show that relationship escalation is associated with more recent and frequent Facebook communication, and making use of a greater number of different types of Facebook media, especially private messages and photo tags. Although the amount of content exchanged in different Facebook media (wall posts and comments; photo and album comments; private messages) was related to relational escalation, its importance was overridden by temporal patterns suggesting that frequency and recency of Facebook communication are more important signals of relational escalation than its overall amount. Furthermore, its linguistic content as captured by the LIWC categories was not related to relational escalation, with the exception of positivity in wall posts and comments, which was negatively related to escalation. Below we discuss theoretical implications of these findings, as well as this study's limitations and directions for future research.

4.1. Theoretical implications

This study extends our understanding of how people maintain relationships on Facebook, and how various maintenance strategies enabled by Facebook contribute to relational escalation,

Table 4

Exponentiated standardized coefficients representing the predicted odds of relationship escalation based on a 1-SD increase in linguistic content of Facebook communication, broken down by type of communication and controlling for temporal and individual factors.

Content of relational communication	β (wall)	β (photo)	β (message)
Intimacy	1.029	1.072	0.919
Immediacy	1.046	1.072	0.950
Positivity	0.722***	0.950	0.972
Self-disclosure	0.955	0.870	0.881
Assurances	1.120	0.978	0.988
Total num. comm. instances (type specific)	1.074	0.985	1.029
Days since first FB comm.	1.404**	1.425**	1.688***
Days since last FB comm.	0.301***	0.322***	0.037***
Average days between FB comm.	0.636***	0.529***	0.449***
Participant FB intensity	1.116	1.070	1.025
Participant age	1.461	1.266	0.858
Participant sex	0.972	1.213	1.228
Friend sex	1.158	1.087	1.125

** $p < .01$.

*** $p < .001$.

stability, and de-escalation. As our findings suggest, new technologies are indeed changing the relational maintenance performance, with more importance placed on communication patterns such as temporal rhythms of communication and use of different media types than its overall content or language dimensions intended to capture traditional dimensions of relational maintenance, such as positivity or self-disclosure. These findings point out to the role of maintained presence and partner's awareness as a new function of relational maintenance enabled by SNSs' affordances, as suggested by [Tong and Walther \(2011\)](#). In other words, frequent and recent communication through multiple Facebook channels can help partners convey a feeling of closeness or propinquity ([Korzenny, 1978](#)), while communication absence from each other's life corresponds to alienation and relational de-escalation. Whereas temporal patterns have been found to be important indicators of relational ties by previous research before ([Gilbert & Karahalios, 2009](#)), our study contributes to understanding their role in relational escalation and de-escalation rather than a mere reflection of the current relational state.

The finding on the importance of the number of Facebook communication forms is consistent with media multiplexity theory ([Haythornthwaite, 2005](#)), but novel in relation to Facebook. As Facebook offers multiple communication forms, reliance on more of them suggests interdependence between partners ([Haythornthwaite, 2005](#)). Furthermore, whereas media multiplexity links communication across multiple media with relational tie strength, our findings extend it further to relational escalation/de-escalation. The increase in interdependence as manifested through the number of Facebook communication types corresponds to relational escalation, and, vice versa, the decreased number of media types signals relational de-escalation.

There could be several explanations for the finding of no effect of language content on relational escalation/de-escalation. Since previous research has relied on perceptions of relational maintenance strategies, it is not clear what specific communication behaviors and patterns underlie these perceptions, as "multiple communication cues can achieve the same communication function" ([Walther & Ramirez, 2009, p. 266](#)). For example, perceptions of commitment to a relationship, positivity, and responsiveness to partners can be created not only through language of communication, but its structural characteristics (e.g., timing, frequency, reliance on multiple channels). These characteristics, as our data show, may play even greater importance in mediated interactions on SNSs like Facebook where relational partners signal attention, relationship continuity, and interactional co-presence to each other through their conversational participation. As [Duck, Rutt, Hurst, and Strejc \(1991\)](#) argued, the very occurrence of conversations, especially "moderated by daily experience" (p. 229) has a symbolic meaning "for creating, sustaining, and manifesting relationships", and that "relationships are essentially unfinished business that needs to be perpetuated through regular mundane relational communication." (p. 231).

As symbolic forms, conversations manifest relationships to others, in addition to relational partners themselves ([Duck, 1991](#)), playing a function of social ties or "public displays of connection" ([Donath & boyd, 2004](#)). This is consistent with our findings that public forms of communication, via photo tags, are associated with relational escalation. Furthermore, talking about a relationship with others, as well as displaying public artifacts signaling the importance of the relationship (e.g., wedding bands in offline interactions), contribute to relationship continuity ([Sigman, 1991](#)), and, thus, can serve a role of relationship maintenance in mediated communication on SNSs. It enables partners to implicitly participate in one another's lives and show responsiveness by providing social validation and acceptance. Furthermore, photo tags tend to capture shared events in which both partners participated offline,

and in this sense, photo tags reflect not only implicit, but also actual participation in each other's lives.

While we did not see evidence of Facebook communication being used to enact traditional relationship maintenance strategies, we do not interpret our findings as saying that strategic maintenance behaviors are not important in maintaining and escalating relationships, but that this type of communication is likely happening elsewhere. In a recent study on interaction rules in Facebook friendships, participants echoed the notion that Facebook is but one important way to maintain relationships with others ([Bryant & Marmo, 2012](#)). They emphasized that good friends should communicate also using methods other than Facebook, close friends should be wished "happy birthday" in some way other than a Facebook post, and information should be shared with close friends in another way, before it is posted to Facebook ([Bryant & Marmo, 2012](#)). As our online and offline lives become more and more enmeshed, it is important to understand the role of different technologies in shaping and extending ways in which we maintain relationships with others, and how mediated and unmediated relational maintenance strategies complement each other.

The finding with respect to content of Facebook communication was a negative relationship between positivity in wall posts and comments and relationship escalation. This finding is at first surprising as positivity is one of the five core maintenance strategies ([Stafford & Canary, 1991](#)). However there is a strong norm of positivity on Facebook ([Qiu et al., 2012](#)) and posts such as "happy birthday", "nice!" or "beautiful" are common. In this sea of positivity, a positive Facebook post may lose its traditional relationship maintenance function in close relationships and instead take on a new meaning more akin to the social grooming behaviors that can increase bridging social capital, especially among weaker ties ([Ellison et al., in press](#)), but not necessarily escalate intimacy in relationships.

4.2. Limitations and future work

This study has several limitations. First, we relied on present perceptions of relationship types both for the present and past assessment, and there were no exact timestamps for when relational changes occurred. This allowed us to explore change and stability in relationships as participants currently view them; however another, more rigorous, approach would use a longitudinal design and measure relational types at different points of time to capture relational changes between the two periods, as well as communication content produced in between. Another limitation is the use of a student sample, which predominantly consisted of young females. Although we controlled for gender and age in the analyses, future research would do well to extend these findings to a more representative sample of Facebook users.

Next, while our research lays groundwork for understanding the role of enacted maintenance behaviors, future studies will need to validate linguistic measures for capturing communication content reflecting specific relational maintenance strategies. While these measures were derived based on the definition of relational maintenance categories, akin to previous research relying on the LIWC language dimensions (e.g. [Gilbert & Karahalios, 2009](#)), they may not exactly represent these strategies. Future studies could utilize questionnaire measures of perceptions of relational maintenance strategies (e.g. [Ellison et al., in press](#); [Stafford & Canary, 1991](#)) along with analysis of actual communication behaviors, as studied in the present work. This will enable a direct investigation of the links between communication maintenance behaviors and their perceptions. Future studies could also use complimentary approaches to analyzing linguistic content such as natural language processing-based sentiment analysis (e.g. [Kouloumpis, Wilson, & Moore, 2011](#); [Paltoglou & Thelwall, 2012](#)) that classifies social

media content using machine learning. Studying SNSs communication within relationships alongside other types of communication, including offline interaction, would also contribute to the understanding of how SNSs are used as one of the many tools of relational maintenance.

4.3. Conclusion

Stability and change are central concepts in understanding relational maintenance because without relationship work, relationships tend to deteriorate. This study contributes an understanding of how relationship work is done on Facebook, and how this relationship work contributes to relational change and stability. We find that the SNS is primarily useful in signifying co-presence and the existence of ties to others, and in this way helps to support relationship maintenance and even escalation. These findings contribute to the theoretical understanding of the ways that such SNSs provide new ways to enact relational communication, and how they may work within the larger system of relational interactions to help people maintain something that we hold dear—our personal relationships with others.

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